CLAIMS

1 (currently amended). An operator-sensing circuit in a calibrated operator sensing system, said circuit comprising:

a) microcontroller means electrically connected for sending commands to a charge-transfer sensor electrically connected for sending sensor charge signals to capacitive means, and receiving raw output capacitive electrode discharge data signals from said capacitive means;

b) upon command by said microcontroller means, said charge-transfer sensor sends a sensor charge signal to said capacitive means having a capacitive hand-sensing electrode disposed on a hand-gripping surface of a unit of power equipment and receives a discharge output signal from the hand-sensing electrode and sends a raw discharge output signal to said microcontroller means electrically connected for disabling the motor of a unit of power equipment upon the absence of an operator's hand on a hand-gripping surface of the equipment;

c) said capacitive means having an electrical characteristic for operating within a predetermined output capacitor discharge range that includes preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

d) said capacitor discharge range is effective to distinguish between the presence of an operator's hand and foreign material on the gripping surface for avoiding a false hands-on signal.

2 (currently amended). In an operator-sensing circuit having a charge-transfer sensor that sends a sensor charge signal to a capacitive hand-sensing electrode and receives a discharge signal from the electrode for disabling the motor of a unit of power equipment upon the absence of an operator's hand on a hand-gripping surface of the equipment, said operator-sensing circuit

comprising:

a) capacitive means for operating within a predetermined output capacitor discharge range that includes preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

b) said capacitive means includes a hand-sensing electrode having an inner dielectric material layer contiguously disposed on a metal handle portion of the power equipment, a metal sheet foil conductor material layer contiguously wrapped around the dielectric material to form a tubular configuration having two opposed end edges, and an outer dielectric hand-grip material including said hand-gripping surface that overlaps said opposed end edges thereby producing a capacitance in a grasping operator's hand, an outer hand-grip material, and the metal sheet foil conductor material layer.

3 (currently amended). The operator-sensing circuit as defined in claim 2, wherein said metal foil conductor material comprises copper and the metal foil layer has a thickness of about 0.10 mm to about 0.15 mm.

4 (currently amended). The operator-sensing circuit as defined in claim 2, wherein said inner dielectric material layer has the structural configuration of a tube that extends along the length of the metal handle portion;

said metal foil has the structural configuration of a foil tube having a longitudinal axis and extends along a delimited length of the inner dielectric material tube;

said foil tube having opposed end edges that are each disposed in respective planes that traverse the longitudinal axis of the metal foil tube; and

said outer hand-grip material has a length sufficient to overlap the opposed end edges of the metal foil tube.

5 (currently amended). The operator-sensing circuit as defined in claim 3, wherein said metal foil tube has a length of from about 50 mm to about 60 mm, the opposed end edges are disposed about 30 mm from the ends of the hand-grip material, and the opposed respective transverse planes are perpendicular to the longitudinal axis of the foil tube.

6 (currently amended). The operator-sensing circuit as defined in claim 1, wherein said predetermined output capacitor discharge range includes a true hands-on section in which the operator's hand is grasping the hand-gripping surface and provides an accurate capacitor discharge digit value that allows the power equipment continued operation;

said circuit includes microcontroller means electrically connected to a motor shut-down circuit, a reference simulator electrode for sending reference discharge signals having a designated standard digit value to said charge-transfer sensor, and multiplexing means having a hand-sensing electrode switch and a simulator electrode switch;

said hand-sensing electrode switch being electrically connected to said capacitive hand-sensing electrode, and said simulator electrode switch being electrically connected to said simulator electrode;

each said hand-sensing electrode switch and said simulator electrode switch being electrically connected to said microcontroller means for sequentially turning said switches on and off to sequentially send said sensor charge signal from said charge-transfer sensor to said hand-sensing electrode and said simulator electrode, and in response for said charge-transfer sensor to sequentially

receive from each said hand-sensing electrode and said reference simulator electrode respective raw electrode discharge digit signals;

upon receiving an output reference simulator signal from said reference simulator electrode that indicates a defect in said multiplexing means, or an output hand-sensing discharge signal from said hand-sensing electrode that indicates the absence of the operator's hand from the hand-gripping surface, said charge-transfer sensor being effective to send said raw output reference simulator signals or said raw output hand-sensing discharge signals to said microcontroller means for evaluating and processing, and to then for said microcontroller means to send a motor shut down signal to said motor shut-down circuit.

7 (currently amended) (withdrawn). In an operator-sensing circuit having a charge-transfer sensor that sends a sensor charge signal to a capacitive sensing electrode and in response receives a discharge signal from the electrode for disabling the motor of a unit of power equipment upon the absence of an operator's hand on a hand-gripping surface of the equipment, the combination comprising:

a) multiplexing means and capacitive means including operator-hand sensing electrode means and reference simulator electrode means each for receiving said sensor charge signal from said charge-transfer sensor;

b) in response to receiving said sensor charge signal, said simulator electrode means being effective to send a reference discharge signal having a designated standard digit value for determining a defect in the operator-sensing system;

c) microcontroller means electrically coupled to said multiplexing means including a

series of electrode switches for issuing said sensor charge signals and electrode output signals;

d) said microcontroller means being effective to alternately turn said series of switches on and off to sequentially send said sensor charge signal to each operator-hand sensing electrode means and reference simulator electrode means, and in response for said charge-transfer sensor to sequentially receive from each operator-hand sensing and reference simulator electrode means respective electrode discharge digit signals;

e) said microcontroller means being electrically coupled for issuing command signals to said charge-transfer sensor to send said charge signals to the multiplexing means for distribution to said operator-hand sensing and reference electrode means;

f) said charge-transfer sensor being effective to send a raw data output discharge signal corresponding to each said respective electrode discharge digit signal to said microcontroller means for processing; and

g) said microcontroller means being effective to disable said motor of the unit of power equipment upon determining that the reference discharge signal does not conform to said designated standard digit value, and upon alternatively determining that the output discharge signal of the operator-hand sensing electrode means indicates the absence of the operator's hand from the hand-gripping surface.

8 (withdrawn) (currently amended). The combination as defined in claim 7, wherein

said microcontroller means is programmable for setting a predetermined operating output capacitor discharge range including preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

said capacitor discharge range is effective to distinguish between the presence of an operator's hand and foreign material on the gripping surface for avoiding a false hands-on signal.

9 (withdrawn) (currently amended). The combination as defined in claim 8, wherein

a preselected binary digit value of about 700 digits designates a hands-on condition for the operator-hand sensing electrode means affixed to a hand-gripping surface, and a preselected binary digit value of about 900 digits designates a hands-off condition for the sensing electrode means affixed to a hand-gripping surface.

10 (withdrawn) (currently amended). The combination as defined in claim 8, wherein

said capacitor discharge digit value of said reference simulator electrode means is about 400 digits which must be received by said charge-transfer sensor to indicate that no defect in the multiplexing means or short in the circuit of the system exists.

11 (withdrawn). The combination as defined in claim 8, wherein

said capacitor discharge range includes a hands-off section in which foreign materials add capacitance to the hand-gripping surface that might produce a false hands-on condition, and a true hands-on section in which the operator's hand is grasping the hand-gripping surface to provide an accurate capacitor discharge digit value that allows the power equipment continued operation.

12 (withdrawn). The combination as defined in claim 11, wherein

said capacitor discharge digit value range of said true hands-on section is about 700 to about 750 digits, and

said capacitor discharge digit value range of said false hands-on section is about 750 to about 900 digits.

13 (withdrawn) (currently amended). The combination as defined in claim 7, wherein the microcontroller means includes first microprocessor means electrically coupled to the charge-transfer sensor and second microprocessor means electrically coupled to the first microprocessor means;

said first microprocessor means electrically coupled to the multiplexing means for sequentially turning said operator-hand sensing electrode and reference simulator electrode switches on and off to send said charge signals through to the respective operator-hand sensing and reference electrode means;

said first microprocessor means being effective for commanding the charge-transfer sensor to send charge signals to the multiplexing switches to be sent through to the operator-hand sensing and references electrode means that in response send capacitive discharge signals to the charge-transfer sensor which sends to said first microprocessor means respective raw data output signals corresponding to the capacitive discharge signals received;

said second microprocessor means being effective to receive the raw data output signals from said first microprocessor means to conduct a control check on the first microprocessor means and to double check the raw data output signals;

said first and second microprocessor means being electrically coupled to respective relay switches that are, in turn, electrically coupled to an ignition system of the motor;

each said first and second microprocessor means independently processes said raw data output signals to produce output microprocessor signals to its respective relay switch that is effective to shut down the ignition system when said microprocessor output signals to their respective relay

switches are not the same.

14 (currently amended). A method of sensing the presence of an operator's hand on a gripping surface of a power equipment unit and causing cessation of operation of a component system of the equipment if the operator's hand is removed from the gripping surface, the steps of the method comprising:

a) providing an operator-hand sensing electrode affixed to said gripping surface that includes capacitive means for operating within a predetermined output capacitor discharge range including preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

b) providing a calibrated operator-hand sensing system including a charge-transfer sensor electrically coupled to the operator-hand sensing electrode;

c) providing microcontroller means electrically coupled to the charge-transfer sensor for periodically commanding the sensor to transfer charge signals to the operator-hand sensing electrode that senses the quantity of charge on the operator-hand sensing electrode and generates a raw data output signal that is transmitted to the charge-transfer sensor which sends raw data output signals to the microcontroller means;

d) processing the raw data output signal in said microcontroller means to determine if the quantity of charge on the operator-hand sensing electrode is in said true hands-on section of the output capacitor discharge range;

e) said microcontroller means is electrically coupled to said component system of the equipment for causing cessation of operation of the component system when the raw data output

signal of the charge-transfer sensor indicates that the quantity of charge is not within the true hands-on section of said capacitor discharge range.

15 (currently amended). The method as defined in claim 14, wherein

the component system is an internal combustion engine of the equipment and electrically couples the ignition system of the engine to ground to shut off the engine when the raw data output signal from the charge-transfer sensor to the microcontroller means indicates that the quantity of charge is not within the true hands-on section of said capacitor discharge range.

16 (currently amended). The method as defined in claim 14, wherein

the component system is an electric motor of the equipment and electrically interrupts a supply of power to the electric motor to shut off the electric motor when the raw data output signal from the charge-transfer sensor to the microcontroller means indicates that the quantity of charge is not within the true hands-on section of said capacitor discharge range.

17 (withdrawn) (currently amended). A calibrated capacitive operator-sensing circuit in combination with a mobile power equipment unit, the combination comprising:

a) the mobile power equipment including an internal combustion engine, a magneto of the engine's ignition system, and a hand-gripping surface for an operator to grip and control movement of the mobile power equipment unit;

b) the capacitive operator-sensing circuit being adapted to sense the presence of an operator's hand on the gripping surface to shut off the engine if the operator's hand is absent from the gripping surface;

c) the capacitive operator-sensing circuit including operator-hand sensing electrode

means affixed to said gripping surface that includes capacitive means for operating within a predetermined output capacitor discharge range that includes preselected binary standard digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

d) said capacitor discharge range including a hands-off section and a true hands-on section which indicates that the operator's hand is grasping the hand-gripping surface;

e) said operator-hand sensing electrode means is electrically coupled to charge-transfer sensor means for sensing any quantity of charge on said electrode means;

f) microcontroller means electrically coupled to said charge-transfer sensor means for periodically commanding the sensor means to transfer charge signals to the operator-hand sensing electrode means to sense the quantity of charge on said sensing electrode means;

g) said sensor means being effective to receive raw data output discharge signals from said electrode means for sending said discharge signals to the microcontroller means for processing when the quantity of charge on the operator-hand sensing electrode means is sensed;

h) said microcontroller means being effective for processing said raw data output signals for determining if a corresponding quantity of charge on the operator-hand sensing electrode means is in said true hands-on section of the capacitor discharge range;

i) said microcontroller means being electrically coupled to said magneto of said engine's ignition system for causing cessation of the engine when the raw data output signal of the charge-transfer sensor means indicates that the sensed quantity of charge is not within the true hands-on section of said capacitor discharge range.

Amended claims showing the deletions and additions.

1 (currently amended). [In an] An operator-sensing circuit in a calibrated operator sensing system, said circuit [having] comprising:

a) microcontroller means electrically connected for sending commands to a charge-transfer sensor [that] electrically connected for sending sensor charge signals to capacitive means, and receiving raw output capacitive electrode discharge data signals from said capacitive means;

b) upon command by said microcontroller means, said charge-transfer sensor sends a sensor charge signal to said capacitive means having a capacitive hand-sensing [sensing] electrode disposed on a hand-gripping surface of a unit of power equipment and receives a discharge output signal from the hand-sensing electrode and sends a raw discharge output signal to said microcontroller means electrically connected for disabling the motor of a unit of power equipment upon the absence of an operator's hand on a hand-gripping surface of the equipment[, the electrical characteristic comprising:] ;

[a)] c) said capacitive means having an electrical characteristic for operating within a predetermined output capacitor discharge range that includes preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

[b)] d) said capacitor discharge range is effective to distinguish between the presence of an operator's hand and foreign material on the gripping surface for avoiding a false hands-on signal.

2 (currently amended). In an operator-sensing circuit having a charge-transfer sensor that sends a sensor charge signal to a capacitive hand-sensing electrode and receives a discharge signal from the electrode for disabling the motor of a unit of power equipment upon the absence of

an operator's hand on a hand-gripping surface of the equipment, said operator-sensing circuit comprising: ~~The characteristic as defined in claim 1, wherein~~

a) capacitive means for operating within a predetermined output capacitor discharge range that includes preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

b) said capacitive means includes [operator-hand] a hand-sensing electrode [means] having an inner dielectric material layer contiguously disposed on a metal handle portion of the power equipment, a metal sheet foil conductor material layer contiguously [disposed of] wrapped around the dielectric material to form a tubular configuration having two opposed end edges, and an outer dielectric hand-grip material including said hand-gripping surface that overlaps said opposed end edges thereby producing a capacitance in a grasping operator's hand, an outer hand-grip material, and the metal sheet foil conductor material layer[;]

~~said conductor layer includes metal foil wrapped around said inner dielectric material~~.

3 (currently amended). The [characteristic] operator-sensing circuit as defined in claim 2, wherein

said metal foil conductor material comprises copper and the metal foil layer has a thickness of about 0.10 mm to about 0.15 mm.

4 (currently amended). The [characteristic] operator-sensing circuit as defined in claim 2, wherein

said inner dielectric material layer has the structural configuration of a tube that extends along the length of the metal handle portion;

said metal foil has the structural configuration of a foil tube having a longitudinal axis and [that] extends along a delimited length of the inner dielectric material tube; [, and]

said foil tube having [has] opposed end edges that are each disposed in respective planes that traverse the longitudinal axis of the metal foil tube; and

said outer hand-grip material has a length sufficient to overlap the opposed end edges of the metal foil tube.

5 (currently amended). The [characteristic] operator-sensing circuit as defined in claim 3, wherein

said metal foil tube has a length of from about 50 mm to about 60 mm, the opposed end edges are disposed about 30 mm from the ends of the hand-grip material, and the opposed respective transverse planes are perpendicular to the longitudinal axis of the foil tube.

6 (currently amended). The [characteristic] operator-sensing circuit as defined in claim 1, wherein

said predetermined output capacitor discharge range includes ~~a hands-off section in which foreign materials add capacitance to the hand-gripping surface that may produce a false hands-on condition, and~~ a true hands-on section in which the operator's hand is grasping the hand-gripping surface and provides an accurate capacitor discharge digit value that allows the power equipment continued operation[.] ;

said circuit includes microcontroller means electrically connected to a motor shut-down circuit, a reference simulator electrode for sending reference discharge signals having a designated standard digit value to said charge-transfer sensor, and multiplexing means having a hand-sensing

electrode switch and a simulator electrode switch;

said hand-sensing electrode switch being electrically connected to said capacitive hand-sensing electrode, and said simulator electrode switch being electrically connected to said simulator electrode;

each said hand-sensing electrode switch and said simulator electrode switch being electrically connected to said microcontroller means for sequentially turning said switches on and off to sequentially send said sensor charge signal from said charge-transfer sensor to said hand-sensing electrode and said simulator electrode, and in response for said charge-transfer sensor to sequentially receive from each said hand-sensing electrode and said reference simulator electrode respective raw electrode discharge digit signals;

upon receiving an output reference simulator signal from said reference simulator electrode that indicates a defect in said multiplexing means, or an output hand-sensing discharge signal from said hand-sensing electrode that indicates the absence of the operator's hand from the hand-gripping surface, said charge-transfer sensor being effective to send said raw output reference simulator signals or said raw output hand-sensing discharge signals to said microcontroller means for evaluating and processing, and to then for said microcontroller means to send a motor shut down signal to said motor shut-down circuit.

7 (withdrawn) (currently amended). In an operator-sensing circuit having a charge-transfer sensor that sends a sensor charge signal to a capacitive sensing electrode and in response receives a discharge signal from the electrode for disabling the motor of a unit of power equipment upon the absence of an operator's hand on a hand-gripping surface of the equipment, the combination

comprising:

a) multiplexing means and capacitive means including operator-hand sensing electrode means and reference simulator electrode means each for receiving said sensor charge signal from [the multiplexing means] said charge-transfer sensor;

b) in response to receiving said sensor charge signal, said simulator electrode means being effective to send a reference discharge signal having a designated standard digit value for determining a defect in the operator-sensing system;

c) microcontroller means electrically coupled to said multiplexing means including a series of electrode switches for issuing said sensor charge signals and electrode [switching] output signals;

d) said microcontroller means being effective to alternately turn said series of switches on and off to sequentially send said sensor charge signal to each operator-hand sensing electrode means and reference simulator electrode means, and in response for said charge-transfer sensor to sequentially receive from each operator-hand sensing and reference simulator electrode means respective electrode discharge digit signals;

[d)] e) said microcontroller means being electrically coupled for issuing command signals to said charge-transfer sensor to send said charge [signal] signals to the multiplexing means for distribution to said operator-hand sensing and reference electrode means;

[e)] f) said charge-transfer sensor being effective to send a raw data output discharge signal corresponding to each said respective electrode discharge digit signal to said microcontroller means for processing; and

[f)] g) said microcontroller means being effective to disable said [engine] motor of the unit of power equipment upon determining that the reference discharge signal does not conform to said designated standard digit value, and upon alternatively determining that the output discharge signal of the operator-hand sensing electrode means [sensing discharge signal] indicates the absence of the operator's hand from the hand-gripping surface.

8 (withdrawn) (currently amended). The combination as defined in claim 7, wherein

said ~~circuit includes capacitive means and said~~ microcontroller means is programmable for setting a predetermined operating output capacitor discharge range including preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

said capacitor discharge range is effective to distinguish between the presence of an operator's hand and foreign material on the gripping surface for avoiding a false hands-on signal. Q

9 (withdrawn) (currently amended). The combination as defined in claim 8, wherein

a preselected binary digit value of about 700 digits designates a hands-on condition for the operator-hand sensing electrode means affixed to a hand-gripping surface, and a preselected binary digit value of about 900 digits designates a hands-off condition for the sensing electrode means affixed to a hand-gripping surface.

10 (withdrawn) (currently amended). The combination as defined in claim 8, wherein

said capacitor discharge digit value of said reference simulator electrode means is about 400 digits which must be received by said charge-transfer sensor to indicate that no defect in the multiplexing means or short in the circuit of the system exists.

11 (withdrawn). The combination as defined in claim 8, wherein

said capacitor discharge range includes a hands-off section in which foreign materials add capacitance to the hand-gripping surface that might produce a false hands-on condition, and a true hands-on section in which the operator's hand is grasping the hand-gripping surface to provide an accurate capacitor discharge digit value that allows the power equipment continued operation.

12 (withdrawn). The combination as defined in claim 11, wherein

said capacitor discharge digit value range of said true hands-on section is about 700 to about 750 digits, and

said capacitor discharge digit value range of said false hands-on section is about 750 to about 900 digits.

13 (withdrawn) (currently amended). The combination as defined in claim 7, wherein

the microcontroller means includes [a] first microprocessor means electrically coupled to the charge-transfer sensor and second microprocessor means electrically coupled to the first microprocessor means;

said first microprocessor means electrically coupled to the multiplexing means for sequentially turning said operator-hand sensing electrode and reference simulator electrode switches on and off to send said charge signals through to the respective operator-hand sensing and reference electrode means;

said first microprocessor means being effective for commanding the charge-transfer sensor to send charge signals to the multiplexing switches to be sent through to the operator-hand sensing and references electrode means that in response send capacitive discharge signals to the charge-transfer sensor [means] which [produces] sends to said first microprocessor means respective raw data output

signals corresponding to the capacitive discharge signals received;

said second microprocessor means being effective to receive the raw data output signals from said first microprocessor means to conduct a control check on the first microprocessor means and to double check the raw data output signals;

said first and second microprocessor means being electrically coupled to respective relay switches that are, in turn, electrically coupled to [the] an ignition system of the motor;

each said first and second microprocessor means independently processes said raw data output signals to produce [an] output microprocessor [signal] signals to its respective relay switch that is effective to shut down the ignition system [down] when said microprocessor output signals to their respective relay switches are not the same.

14 (currently amended). A method of sensing the presence of an operator's hand on a gripping surface of a power equipment unit and causing cessation of operation of a component system of the equipment if the operator's hand is removed from the gripping surface, the steps of the method comprising:

a) providing [a] an operator-hand sensing electrode affixed to said gripping surface that includes [a] capacitive means for operating within a predetermined output capacitor discharge range including preselected binary digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

b) ~~said capacitor discharge range is effective to distinguish between the presence of an operator's hand and foreign material on said gripping surface for avoiding a false hands-on signal;~~

~~c) said capacitor discharge range includes a hands-off section in which foreign materials~~

~~add capacitance to the hand-gripping surface that may produce a false hands-on condition, and a true hands-on section in which the operator's hand is grasping the hand-gripping surface and provides an accurate capacitor discharge digit value that allows the power equipment continued operation;~~

~~d)~~ providing a calibrated operator-hand sensing system including a charge-transfer sensor electrically coupled to the operator-hand sensing electrode;

[e)] c) providing microcontroller means electrically coupled to the charge-transfer sensor for periodically commanding the sensor to transfer charge signals to the operator-hand sensing electrode that senses the quantity of charge on the operator-hand sensing electrode and generates a raw data output signal that is transmitted to the charge-transfer sensor which sends raw data output signals to the microcontroller means ~~when the quantity of charge on the sensing electrode is sensed~~;

[f)] d) processing the raw data output signal in said microcontroller means to determine if the quantity of charge on the operator-hand sensing electrode is in said true hands-on section of the output capacitor discharge range;

[g)] e) said microcontroller means is electrically coupled to said component system of the equipment [and causes] for causing cessation of operation of the component system when the raw data output signal of the charge-transfer sensor indicates that the quantity of charge is not within the true hands-on section of said capacitor discharge range.

15 (currently amended). The method as defined in claim 14, wherein

the component system is an internal combustion engine of the equipment and electrically couples the ignition system of the engine to ground to shut off the engine when the raw data output signal from the charge-transfer sensor to the microcontroller means indicates that the quantity of

charge is not within the true hands-on section of said capacitor discharge range.

16 (currently amended). The method as defined in claim 14, wherein

the component system is an electric motor of the equipment and electrically interrupts a supply of power to the electric motor to shut off the electric motor when the raw data output signal from the charge-transfer sensor to the microcontroller means indicates that the quantity of charge is not within the true hands-on section of said capacitor discharge range.

17 (withdrawn) (currently amended). A calibrated capacitive operator-sensing circuit in combination with a mobile power equipment unit, the combination comprising:

a) the mobile power equipment including an internal combustion engine, a magneto of the engine's ignition system, and a hand-gripping surface for an operator to grip and control movement of the mobile power equipment unit;

b) the capacitive operator-sensing circuit being adapted to sense the presence of an operator's hand on the gripping surface to shut off the engine if the operator's hand is absent from the gripping surface [,] ;

c) the capacitive operator-sensing circuit including operator-hand sensing electrode means affixed to said gripping surface that includes capacitive means for operating within a predetermined output capacitor discharge range that includes preselected binary standard digit values that designate hands-off and hands-on conditions on the hand-gripping surface;

d) said capacitor discharge range including a hands-off section in which foreign materials add capacitance to the hand-gripping surface that may produce a false hands-on condition, and a true hands-on section which indicates that the operator's hand is grasping the hand-gripping

surface;

[The, and the,]

e) said operator-hand sensing electrode means is electrically coupled to charge-transfer sensor means for sensing any quantity of charge on [the] said electrode means;

f) microcontroller means electrically coupled to said charge-transfer sensor means ~~is electrically coupled to the microcontroller means~~ for periodically commanding the sensor means to transfer charge signals to the operator-hand sensing electrode means [, and] to sense the quantity of charge on [the] said sensing electrode means;

g) said sensor means being effective to receive [generate] raw data output discharge signals from said electrode means for sending said discharge signals to the microcontroller means [to process] for processing when the quantity of charge on the operator-hand sensing electrode means is sensed;

h) said microcontroller means being effective [to process a] for processing said raw data output [signal] signals for determining if a corresponding quantity of charge on the operator-hand sensing electrode means is in said true hands-on section of the capacitor discharge range;

i) said microcontroller means being electrically coupled to said magneto of [the] said engine's ignition system for causing cessation of the engine when the raw data output signal of the charge-transfer sensor means indicates that the sensed quantity of charge is not within the true hands-on section of said capacitor discharge range.

In the written description: At page 10 after the subtitle, DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS, beginning at line 13 and continuing to page 11, line 19, amend the first two paragraphs as follows:

Referring to Figure 1, an operator-sensing circuit, generally designated 10,includes a capacitive sensing electrode 12 affixed to the gripping surface of the power equipment and reference simulator electrode 14 respectively connected electrically to sensing electrode switch 16a and simulator electrode 16b of multiplexer 16. Charge sensor 18 may be any programmable charge-transfer sensor that does not process the capacitance electrode discharge signals and is not self-calibrating. In a specific embodiment, sensor 18 has a commercial designation of QT 300 and receives electrical power from a 3-5 volt battery 15. Sensor 18 sends information signals to multiplexer 16 upon command from microcontroller 20 every 5 milliseconds that also sends a series of commands to multiplexer 16 to turn electrode switches 16a and 16b on and off to send the information signals to electrodes 12 and 14 and in response receives an electrode discharge signal through the closed (on) switch in multiplexer 16. Sensor 18 performs a measuring function in comparing the number of digits received from electrodes 12 and 14 with respect to capacitor 17. Sensor 18 then provides a raw data output signal to microcontroller 20 that knows to which electrode 12 or 14 the signal relates based on which switch microcontroller 20 has closed. For microcontroller 20 sends a cycle of sequential switching signals to multiplexer 16 to sequentially turn sensing electrode switches 16a and reference simulator electrode switch 16b off and on to allow the information signals to flow to and from electrodes 12 and 14. The information flow indicates a hands-on or hands-off status with respect to each operator hand-sensing and reference electrode in

accord with the graphic diagram of Figure 7 discussed below. While Figure 1 shows only one sensing electrode 12, the process and circuit for performing the operator-sensing method of the invention may include two hand-grips as shown used in the power equipment 30 and 55 of Figures 3 and 4.

On receiving the information charge of sensor 18, electrodes 12 and 14 sequentially return binary information measured in digits to sensor 18 and capacitor 17. Operator-sensing circuit 10 is calibrated so that reference simulator electrode 14 always sends a preselected standard of 400 digits to charge sensor 18 so long as simulator electrode 14 senses no defect in multiplexer 16 or short circuit in the system. If sensor 18 does not receive 400 digits from reference electrode 14, microcontroller 20 receives an output signal of raw data from sensor 18 to evaluate and process the reference return signal[. Then] and then it sends a shut-down signal to motor shut-down circuit 22. In this embodiment, the capacitance of reference electrode 14 is 100 pF ($100x10^{-12}$ farads) and the capacitance of sensor capacitor 17 is 150 nF ($150x10^{-9}$ farads). As noted, operator-sensing unit circuit 10 of Figure 1 is used with a one hand-gripping surface as found on a chainsaw, for example. In power equipment having to hand- grips as shown in Figures 3 and 4, a capacitive sensing electrode 12 is affixed to the gripping surface of each hand-grip.

At page 12, lines 10 through 18, amend the paragraph as follows:

Sensor 18 provides one signal to multiplexer 16 so that when microcontroller 20 commands sensor 18 and multiplexer 16 [withe] with switches 16a and 16b to turn on and off in sequence, that same impulse burst from sensor 18 will be sent to the respective sensing and simulator electrodes 12

and 14. Sensor 18 does not differentiate the location of the digit signal coming from the sensing electrode 12 and the reference simulator electrode 14. Sensor 18 simply counts the number of digits that come from multiplexer 16 and compares it to the capacity value of capacitor 17 when sensor 18 sends an impulse burst signal of charge to the sensing and reference simulator electrodes. When an operator's hand is on the gripping surface, the capacitance becomes larger and the number of digits sent from an electrode to sensor 18 is accordingly smaller.

At page 13, lines 3 through page 14, line 1 amend the paragraphs as follows:

As shown, with a hands-on condition sensing electrode 12 will discharge about 700 to about 760 digits to sensor 18. With a hands-off condition on the gripping surface, about 850 to about 900 digits are sent to sensor 18. The gray band is a safe hands-off detection zone in which sensor 18 will send a raw data output signal to microcontroller 20 to disable the component system of the power equipment 30 and 55. Thus system 10 eliminates the possibility that a false hands-on condition will be reported to microcontroller 20 because water and dirt produces a capacitance discharge signal that is always in the hands-off section of the output discharge range as shown in Figure 7. Hand-grips 42, 44 on handle portion 37, and hand-grips 52, 53 on handle portions 56, 57 are associated with a metal [coil] foil tube, as shown, having an edge surface in a plane that is perpendicular to the longitudinal axis of the grip as shown in Figures [4 and 5] 5 and 6. It has been unexpectedly found that the foil tube of the invention must be shorter than the width of a operator's hand (about 50 millimeters), and that the outer grips [30, 32,] 42, 44 and [40, 42] 52, 53 should overlap the end edges by about 30 millimeters as in Figures [2 and 3] 5 and 6.

If for example, the diameter of the grip is about 20 to about 30 millimeters, the circumference at one edge is about 60 to 90 millimeters so with two edges at opposed ends of the tube the approximate edge length is about 120 to 180 millimeters. Thus the metal foil tube is less likely to be affected by water and dirt on the gripping surface. On the other hand, with about 2,000 millimeters length of edge such as may be available in a wire coil or net-shaped metal coil used on the electrode, the electrode capacitance is more likely to be more greatly increased to approach a false hands-on signal when water and dirt or a mixture thereof is on the hand-gripping surface. A glove on the hand would not produce as much capacitance as the bare hand, but would still fall within the hands-on segment below the gray band. If sensor 18 received from about 700 to [760] about 750 digits then microcontroller 20 knows that a hands-on condition exists on the gripping surface. The most difficult condition on the gripping surface is when the operator is wearing thick gloves and water and mud are present. The dark band is a safe band where neither constitutes a safe range of capacitance. So any digits above the lower limit of the band would stop the power equipment motor. So any digits above the lower limit of the band would stop the power equipment motor.

At page 14, lines 2 through 14, amend the paragraph as follows:

Figure 2 shows another embodiment of system circuit 10 having a fail-safe microcontroller. Microprocessor 60 electrically coupled to sensor 18 and microprocessor 62 electrically coupled to microprocessor 60. Microprocessor 60 is electrically coupled to multiplexer 16 for sequentially turning sensing electrode switch 16a and reference simulator electrode switch 16b on and off to send charge signals through to the respective sensing electrode 12 and reference electrode 14. Assuming

that the push-lawnmower 30 of Figure 3 is started without an operator's hand on one of the [hand-rips] hand-grips 42 and 44. Microprocessor 60 does not start commanding sensor 18 to send charge signals to multiplexing switches 16a and 16b until a hand-grip 42 and 44 is grasped. Vehicle 55 has a clutch and can be started with or without hands-on either hand-grip 52 or 53 in the pre-calibrated system of the invention. In this instance, microcontroller 60 starts its commands to sensor 18 that sends a charge signal to sensing electrode 12 and reference electrode 14 upon releasing the clutch. In immediate response electrodes 12 and 14 send capacitive discharge signals to sensor 18 which produces respective raw data output signals corresponding to the capacitive discharge signals received.